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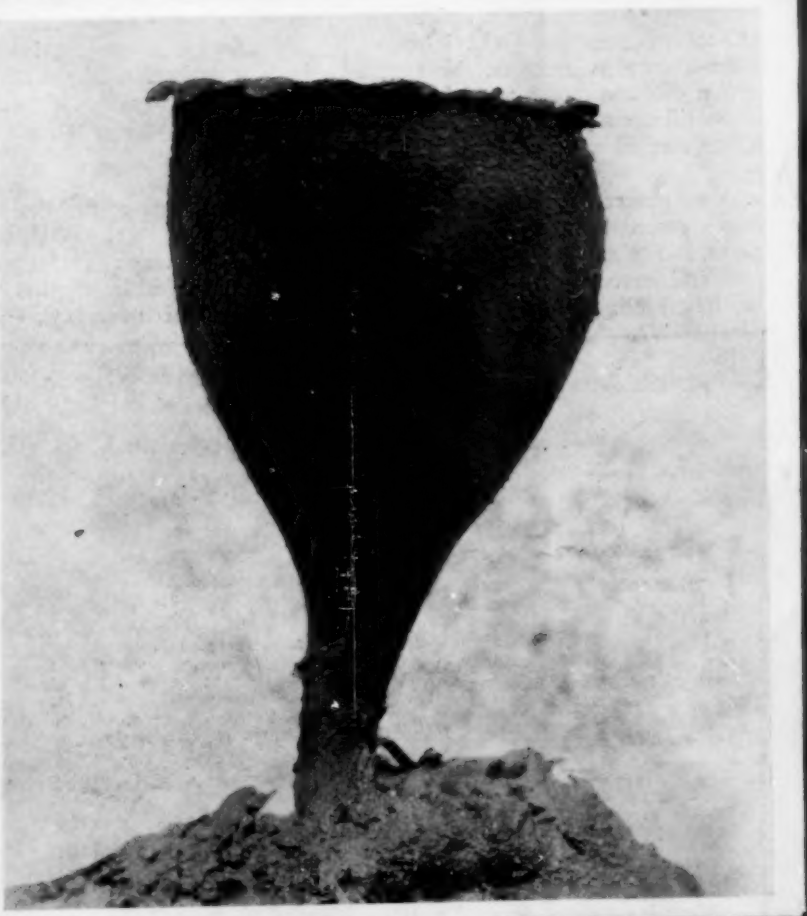
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



SEPTEMBER 2, 1933

Design For an Urn

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SCIENCE NEWS LETTER

VOL. XXIV *No. 647*

The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

The world now has more than 500 cities with 100,000 or more population.

About 14,400 American Indians are engaged in reforestation work under the President's Emergency Conservation Program.

Fresh vegetables kept in warm temperatures lose more of their sweetness than vegetables kept in a cool place.

The Romans gave the gladiolus its name—meaning little sword—because the long leaves reminded them of the weapons.

The gypsy moth, now a serious menace to American trees, was introduced from France in 1869 on the fanciful notion that the moths could be crossed with silkworm moths to produce a hardy race of silk-producing insects.

A new recreation map of the United States, issued by the office of national parks, shows more than a thousand federal and state reservations of interest to the traveling public.

Glass manufacture uses the largest industrial furnaces in the United States.

So far no earthquake centers have been located at or near the North or the South Pole.

An Apache Indian girl shows her endurance and fitness for womanhood by a ceremony in which she must dance all night.

To combat the destruction wrought by caterpillars in German forests, officials use a corps of ten airplanes to spread insecticide dust in caterpillar season.

Blueberry farming in New England has been stimulated by a new and efficient device for winnowing the berries, separating good berries from green and spoiled ones.

While digging foundations for a new wing of a hospital at Larnaca, Cyprus, workmen recently found a hoard of several hundred ancient coins, mostly fifth century B.C.

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RADIO
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These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Book Dept., Science News Letter, at publishers' prices, prepaid in the United States.

RADIO

Ultra-Short Radio Waves Sent Around Curvature of Earth

Marconi Again Achieves "Impossible" in Transmission With Two-Foot Waves Over Distance of 94 Miles

GUGLIELMO Marconi has again confounded the prophets. He has shown that his ultra-short radio waves are able to pass through mountains and even curve around the surfaces of the earth to receiving stations far below the horizon.

History repeats itself again. For in 1901 Prof. H. M. Poincaré, distinguished French mathematician, predicted that communication with electrical waves would be limited to about 165 miles. In that same year Marconi demonstrated that electrical waves could be sent and received across the Atlantic.

Modern theorists had predicted that the ultra-short waves would act like light waves from a searchlight and would not be detectable beyond the horizon. Messages have now been sent from the inventor's yacht to an experimental station 94 miles away in inland Italy, more than three times the predicted distance.

The explanation for this property of the waves to bend about the earth and to curve around objects is not known. Theorists have attacked the problem by treating the radio waves as light waves and have extended the diffraction theory which explains the microscopic bending of light around corners to the ultra-short radio waves, but without marked success.

Vast Transmission Field

The success of Marchese Marconi in perfecting the transmission and reception of these ultra-short radio waves opens up a vast field in the modern science of the transmission of information.

Marconi's new waves are only two feet long as compared to the ordinary radio waves of about 900 feet. Their most distinctive feature is that they are almost like light waves and can be focussed upon a receiver, thus allowing private communication. It is thought that they can not be reflected back from the ionized layers of the upper atmosphere, which act as huge reflectors to ordinary radio waves. A beam of the ultra-short waves directed upwards would pass through this region which is about 200 miles above the earth and shoot off into interplanetary space.

Marconi and other Europeans, as well as investigators in this country, are using the ultra-short waves much like a searchlight. Since the waves are not much longer than light waves they may be focussed and projected by parabolic reflectors and antennae similar to a section of an automobile headlight. These "quasi-optical" waves are thus not adapted to long distance communication but may readily be devoloped for private communication between stations where telegraphy or telephony is impracticable.

In contrast to long radio waves, the Marconi waves have the advantages of being efficiently projected in small directive beams, requiring minute amounts of power, of not being affected by atmospheric disturbances, and of allowing secrecy of communication.

The renewed interest in these short waves brings up the question of allocation of wave lengths to various types of broadcasting. In the earlier days of radio the commercial broadcasting stations received the then popular band of wave lengths from about 200 meters to 550 meters. The amateur radio experimenters were given the then impractical short wave band from 5 meters to 100 meters. But time has shown that the latter band is extremely valuable and it has been encroached upon by the police, air transport lines, and governmental services. The congestion that has arisen may be relieved by the growing use of the ultra-short waves from about 5 meters down to 5 centimeters or about 2 inches. Below this minimum wave length the waves are too greatly absorbed by the atmosphere to be valuable for communication purposes.

More Channels

Although the spread in wave length of these quasi-optical waves is very small, the frequency range is enormous. Carrier waves of commercial broadcasters have a range of frequency from 500 kilocycles to 1500 kilocycles and as each station needs about 10 kilo-

AT FIRST MEETING OF PRESIDENT'S BOARD

These scientists attended the first meeting of the Science Advisory Board of the National Research Council, recently named by President Roosevelt to aid the Government in coping with scientific problems, (SNL, Aug. 19, '33, p. 123), which was held in the National Academy of Sciences building in Washington August 21, 22, 23. Left to right—Isaiah Bowman, Chairman, National Research Council, and Director, American Geographical Society; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, and Chairman of the Executive Council, California Institute of Technology; Karl T. Compton, Chairman of the Committee, and President, Massachusetts Institute of Technology; C. K. Leith, Professor of Geology, University of Wisconsin; W. W. Campbell, President, National Academy of Sciences; Frank B. Jewett, President, Bell Telephone Laboratories; and John C. Merriam, President, Carnegie Institution of Washington. The two members unable to attend this meeting were Gano Dunn, President, J. G. White Engineering Corp.; and Charles F. Kettering, President, General Motors Research Corp.

cycles for a channel there are only 100 frequency bands available. The ultra-short waves have a frequency range of from 60,000 kilocycles to 6,000,000 kilocycles. Thus there would be room for 594,000 channels if each station would still require a 10 kilocycle band.

Foreign countries have used the short waves between 1500 to 50,000 kilocycles for commercial broadcasting for many years. The new shorter waves will find application in television and private broadcasting. They have already replaced optical or light signalling between coastal stations and between forts along a frontier. Marconi has expressed the opinion that they will be found advantageous in many cases where the erection and maintenance of an ordinary short distance telephone or cable circuit is difficult, or too expensive.

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PSYCHOLOGY

Individual Needs Considered In Re-employment Program

IF YOU SHOULD look for a job in one of the new U. S. Employment Service offices, you may be sure of receiving individual attention. The old method of crowded handling of masses of applicants is banned by a new guide or manual under which all public employment offices are expected to operate.

The manual, which is now being prepared under the direction of Dr. William H. Stead, new head of the Employment Service's division of standards, will state the standards which employment offices must meet, and will serve as a guide to officials operating such offices.

A personal interview with each applicant is one of the requirements of this new handbook. Other improved procedures are recommended. For example, instead of requiring the applicant to list on his record the last four jobs he has held, the new manual requires that he list his last job, the most important job he ever held—that is, the one in which he feels he was most effective—and the job that paid him the highest salary. This gives a much more accurate picture of what the person is capable of, especially at present when a great many have been forced out of their regular vocations and have had to take anything and everything that might be available.

The personnel of the offices receiving Uncle Sam's okay must be up to certain standards, too. Both experience in employment work and a certain minimum of training are required for these positions.

No attempt will be made, at present at least, to give the applicants vocational guidance Each office will, however, gather information on the labor market; what industries are expanding in the locality, which are running behind, where the greatest opportunities for employment and advancement may be found. All this information will be sent to the Washington office which will serve as a center for the latest employment information.

Plans are under way for the U. S. Employment Service to cooperate with national foundations in a research program with a view to improving the work of the employment offices as the central machinery in organizing the labor market. Two projects are being actively considered at the present time. The first is an application of the methods of simplified practice to employment. At present each industry has its own classification of multitudinous jobs, even the names of which are unknown outside that particular industry. Some of them are very simple operations, perhaps requiring the tossing of articles into a hopper or feeding them onto an endless belt. Others require strength and involve lifting of heavy weights. Still others are supervisory in nature, and so on. The projected research program plans a re-classification of jobs in all industries in terms of the human qualities required. Then the man who is qualified for a job in one industry will be able to secure employment at the same sort of work in another industry.

The second project will involve a thorough study of persons successfully employed in various types of work to determine what qualities lead to success in each occupation and how to measure those qualities in a given individual.

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PHYSICS

Physicist Reconciles Views Of Matter and Electricity

SCIENTISTS can at last reconcile the classical concepts of electricity with the ultra-modern view of matter and electricity, Prof. Max Born, theoretical physicist of the University of Göttingen, Germany, has announced in a communication to the Aug. 19 issue of *Nature*.

Many unsuccessful attempts have been made in the last few years by eminent theorists to combine the classical concepts of electricity first expressed in a mathematical form by Prof. Clark Maxwell in 1864 with the new quantum concepts of Profs. W. Pauli, Werner Heisenberg and P. A. M. Dirac. The failure of these attempts was not due to the quantum theory but rather to the classical concepts that did not take account of the size of the minute particle of electricity, the electron, but considered it as a mathematical point.

Prof. Born has deduced how the Maxwell equations must be changed. His treatment of the problem is based on a new method of considering the allowable states of an electrical field. The four dimensions, three of distance or space and one of time, are treated symmetrically and the principle of relativity is fulfilled.

With this new treatment Prof. Born states that there is no difficulty in calculating the properties of a moving electron on the basis of the classical theory, a feat that could not be accomplished previously.

Prof. P. A. M. Dirac, leading mathematical physicist in England, gave his opinion that this reconciliation is a major advance in the understanding of matter and electricity.

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CHEMISTRY

Ozone Most Abundant Eight Miles Above Earth

THE REALTOR'S slogan "Out of the smoke zone, into the ozone," based on dubious claims of the health-giving properties of ozone, would necessitate a trip to the stratosphere, for Drs. F. W. P. Götz of the Lichtklimatisches Observatorium, Arosa, Switzerland, G. M. B. Dobson and A. R. Meetham of Oxford, England, have announced in a communication to *Nature*, that ozone is

THEY STILL WHISTLE

Despite their age of almost one thousand years, these whistling jugs from ancient Peru still whistle when they are moved about. Change in water level within the jugs forces air through a whistling device. Dr. John Alden Mason, curator of the American division of the University of Pennsylvania Museum, is regarding his recent acquisitions.

most abundant in a layer about eight miles above sea level.

Ozone is a form of molecular oxygen that has three atoms of oxygen to each molecule instead of two as in the common oxygen necessary to support life. It has a peculiar sharp odor and is usually produced by high-voltage electrical discharges. Engineers in high-voltage generating plants often suffer from severe headaches supposed to be due to too great a concentration of ozone in the air.

Estimates of the height of this layer are based upon observations of the spectrum or color of the clear blue sky directly overhead when the sun is either rising or setting. The experimenters state that changes in meteorological conditions affecting the total supply of ozone take place at these great heights and not near the surface of the earth.

Previous estimates of the height of this layer were very unreliable and placed it at about 25 to 30 miles above sea level.

CHEMISTRY

Dead Seas Hoard Minute Amounts of "Heavy" Water

Borax Beds, Dead Sea and Great Salt Lake Are Reservoirs; Excess Weight Proportioned Between Hydrogen and Oxygen

THE NEW "heavy" water, science's latest strange addition to common chemical substances, has been found in detectable quantities in the salt deposits at the bottom of extinct stagnant seas.

Dr. E. B. Washburn, chief chemist of the Bureau of Standards, has announced that the richest natural source of this peculiar type of water is to be found in native borax, a salt that exists in the beds of dead seas. The water of crystallization of this native borax contains seven parts of heavy water in every million parts of ordinary water.

Samples taken from the largest existing bodies of stagnant water, the Dead Sea in Asia Minor and the Great Salt Lake in Utah, when purified showed an increased weight over pure ordinary water. The Dead Sea water was heavier by two parts in a million and the Great Salt Lake sample was three parts in a million in excess of standard light water.

These natural sources of heavy water do not begin to compare in concentration with those prepared in the laboratory by Prof. Gilbert N. Lewis, distinguished chemist at the University of California. Prof. Lewis has succeeded in preparing heavy water that is 35,000 parts per million heavier than ordinary water. Recently he has shown that pure heavy water will prevent the sprouting of tiny tobacco seeds and is determining now whether the seeds subjected to these tests were actually killed or only inhibited.

Dr. Washburn explained the presence of heavy water in stagnant seas as due to the faster evaporation of light water. The strange heavy component lags behind and in the course of thousands of years the remaining water becomes richer and richer in heavy water. The native borax that gave the highest concentration presumably came from a sea that was very old and had very few sources of fresh water.

Heavy water, like all water, has two atoms of hydrogen and one atom of oxygen. But either the hydrogen or the oxygen atoms, or both, in the heavy water have heavier hearts or nuclei than the common hydrogen or oxygen nuclei present in ordinary water. These rare types of hydrogen and oxygen are known as hydrogen isotope of mass two and oxygen isotopes of masses eighteen and seventeen. Part of the increased weight of the heavy water is due to the heavy hydrogen atoms and part is due to the heavy oxygen. The discovery of heavy hydrogen was made only two years ago by Prof. H. C. Urey and Dr. G. M. Murphy of Columbia University and Dr. F. G. Brickwedde of the U. S. Bureau of Standards.

Just how much of the increased weight of heavy water is due to heavy-weight hydrogen and how much to heavy-weight oxygen has been shown by Prof. Gilbert N. Lewis of the University of California in a communication to the *Journal of the American Chemical Society*.

All water molecules are composed of two atoms of hydrogen and one atom of oxygen, H_2O. But there are two kinds of atoms of hydrogen and three kinds of atoms of oxygen. The different atoms of any one element have different weights because (*Turn to Page* 156)

ENGINEERING

Idle Boilers Protected From Rust With Ammonia

RUSTING of idle steam boilers may be overcome by the use of gaseous ammonia, is the statement of the Merseburg ammonia works of the large German dye manufacturing company I. G. Farbenindustrie.

Boilers that are to be shut down are blown dry with air as completely as possible and then filled with ammonia gas from a pressure container. The ammonia reacts with the remaining water in the boiler to form rust-proof surfaces. These compounds can be removed from the surface by flushing the boiler with water.

ASTRONOMY

Look Overhead

Attractions of Evening Skies Center at the Zenith In Cygnus, Constellation Full of "Holes in the Sky"

By JAMES STOKLEY

LOOK OVERHEAD these September evenings, and you will see some of the most conspicuous astronomical objects now visible. At about ten o'clock, local standard time, at the beginning of the month, an hour earlier on the fifteenth, and at eight o'clock at the end of the month (which are the times for which the accompanying maps show the skies) the constellation of Cygnus is at the zenith. The name means "swan," but the group is frequently called the "northern cross," on account of its shape. The top of the cross points to the northeast, at the head is the bright star Deneb.

In addition to Deneb, there are five other first magnitude stars shown on the maps for this month. Directly west of it is another, and even more brilliant star, Vega, in the constellation of Lyra, the lyre. To the south of this pair, forming with them a pretty good isosceles triangle, is Altair, which marks Aquila, the eagle. Low in the northeast can be seen the group of Auriga, the charioteer, with the brilliant Capella.

The constellation of Bootes shines low in the western sky, with the first magnitude Arcturus still visible, though no longer as conspicuous as it has been during the summer months. The sixth of the bright stars now to be seen is near the southeastern horizon. It is Fomalhaut, and is included in the southern fish, Piscis Austrinus.

Directly south can now be seen another body looking like a first magnitude star, but distinctly different because of its steady leaden light. This is the planet Saturn, which now is in the constellation of Capricornus. Saturn, most distant member of the sun's family that can be seen without the aid of a telescope, is famous for its system of rings, which can be seen with a modest sized telescope.

Two other planets can be seen in the early evening this month, but are not shown on the maps because by the time for which they are adjusted, the planets have descended behind the western horizon. Both can be seen low in the southwest just after sunset.

Most conspicuous is Venus, of magnitude minus 3.5 on the fifteenth, far more brilliant than any other star or planet. In the middle of the month it sets about an hour after the sun. A short distance to the left of Venus, and much inferior in brilliance, is Mars, which will soon disappear from the evening sky for several months. Venus will remain with us for a while, though it will not rise much higher in the sky. It is still moving away from the sun, but when it is the evening star at this time of year, its motion is along a path so nearly parallel to the horizon that actually it sets a little earlier at the end of the month than at the beginning.

Behind the Sun

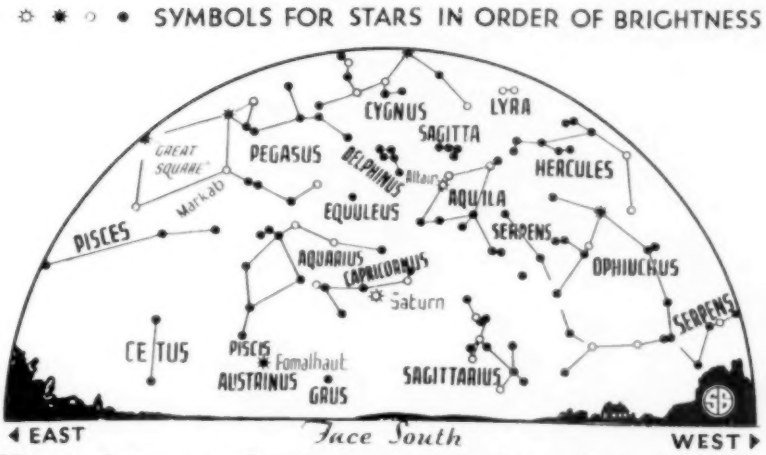
Jupiter, which was so prominent in the spring and summer months, is now so close to the sun as to be completely invisible. On the 27th it is directly behind the sun, and after several weeks it will reappear in the morning sky just before sunrise. Mercury will also be directly behind the sun, and invisible, on the 12th.

Let us return to Cygnus, which is interesting enough to deserve further consideration. First of all, this group lies right in the Milky Way, which, as a matter of fact, here divides into two branches. To a person who lives constantly in a larger city, the Milky Way is an unfamiliar object. Such a person will be well repaid for a visit on a clear evening this month to the country, far away from the city lights, where this luminous band stretching across the sky can now be seen at its best.

A pair of field glasses, or even opera glasses, will reveal, as did Galileo's primitive telescope when he first turned it on the stars in 1610, the true nature of this Milky Way. With such slight optical aid it is resolved into a cloud of stars. It is especially glorious along the line forming the bottom portion of the cross, where one can see swarms of stars, each a sun like our own but vastly farther away. Occasional dark gaps also appear.

With an extra powerful field glass, if held steadily, as in a tripod, or better yet, with a small telescope, magnifying perhaps fifty times, the star at the bottom of the cross, known as Albireo, is seen as a most fascinating object. With such assistance, it is no longer the single star that it seems to the naked eye, but is revealed as a member of the large family of double stars, pairs of suns, with each member revolving around their common center. The telescope reveals many such doubles, but none more beautiful than Albireo, for the two stars that compose it, though of similar brilliance, have contrasting colors. One is yellow, the other blue. If Albireo, like the sun, should happen to be surrounded by a family of planets, life on one of them would be most interesting, with these brilliantly colored orbs lighting the daytime sky.

The North Map contains four of the six first magnitude stars this month—Vega and Deneb near the zenith, and Arcturus and Capella close to the horizon.



In addition to Saturn, two other planets can be seen this month, low in the southwest just after sunset. They are not given on this map, however, because by the time for which the map is adjusted, the planets, Venus and Mars, will have descended below the horizon.

The huge telescopes of modern observatories, especially the 100-inch reflector at Mount Wilson, greatest in the world, have shown previously unsuspected glories of the constellation of Cygnus. A little to the east of Deneb is the largest of these, a cloud of nebulosity that covers an area in the sky many times that of the full moon, though it is so faint that a time exposure photograph of many hours is required with a great telescope to bring out its details. This is called the North America nebula, because it corresponds closely in shape to our own continent. Two clouds of dark nebulae, that may once have been luminous themselves, but are now apparent only because they are silhouetted against a bright background, form the "Gulf of Mexico," and "Hudson Bay." Around it are lanes of similar dark nebulosity, which sharply outline its edges.

The Pelican Nebula

Just to the west of the North America nebula is another that has been christened the Pelican nebula, also from its shape. The bird is shown in considerable detail even to its huge beak which can hold more than its—stomach can! A very beautiful photograph of this object, made with the 100-inch Mount Wilson telescope by Prof. J. C. Duncan, reveals that it is crossed by curious dark lines, which are also, without doubt, dark nebulae. In fact the whole constellation of Cygnus is famous for these dark nebulae, many of which look, as Sir William Herschel, the great English astronomer, exclaimed when he saw one, like "holes in the sky."

With some it is hard to believe that we are not looking down a tube devoid of stars, but with the stars of the sky continually in motion it is hard to imagine that there would be so many of these starless tubes pointed to the earth. The late Prof. Edward Emerson Barnard, of the Yerkes Observatory, and one of the greatest of modern observers, catalogued a number of these dark markings, and showed that they are undoubtedly clouds of dark matter. Perhaps they are scattered all over the sky, but we can only observe them when in front of a background of bright stars. Consequently, it is not surprising that they should be conspicuous in Cygnus, where there are plenty of bright stars to serve as a background.

Still another beautiful nebula is found in Cygnus, surrounding the star Sadr, at the intersection of the cross. This is so faint that even through the largest telescope it is not apparent to the eye, but a photograph with an exposure of six or seven hours, perhaps made on two successive nights, portrays its delicate form. It is called the network, or veil, nebula, and is in two parts, which are connected to form a wreath. A few years ago Dr. Edwin P. Hubble at the Mount Wilson Observatory compared some photographs that he had just made with others made many years previously by Prof. George W. Ritchey, and found that the nebula is moving outwards from the center of the wreath.

Dr. Hubble has offered a reasonable explanation of this movement. He suggests that the wreath is the result of a celestial explosion many thousands of years ago, when something happened to a previously inconspicuous star, causing it suddenly to flare up and shoot out a cloud of stellar material which ever since has been travelling away in a widening circle.

One of the astronomical events that we use to divide our calendar into seasons occurs on September 23. On that date, at 7:01 a. m., eastern standard time, the sun, which has been moving southward in the sky since last June, crosses the Equator, and this is taken as the beginning of autumn. On that date the sun is above the horizon just as long as it is below, the night and day are therefore equal, and so this event is called the autumnal equinox. After that, the nights will continue to lengthen until the beginning of winter, next December.

The moon is full on September 4, at last quarter on the 11th, new on the 19th and at first quarter on the 26th. This means that the evenings will be moonlit for the first week of September, and again during the last week. On the 22nd the crescent moon passes close to the planet Venus. During the night of the 29th, it passes within a little more than its own diameter of the planet Saturn. Both of these events will make interesting spectacles.

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CHEMISTRY

Tastiest Liquids Come Out of Green Bottles

EXPOSURE to light is bad for all liquids from beer to kraut juice, but green light has been found to be the least harmful.

Experiments on apple and kraut juices made by D. C. Carpenter at the New York Agricultural Experimental Station and reported to the American Chemical Society show that blue bottles will ruin the taste of these juices and fade their color to a marked extent. Storage in red bottles may enhance the color of the liquid but it will make kraut juice taste like decaying cabbage.

The best treatment is to keep the juice in the dark until it is necessary to open it. If it has to be exposed for advertising, green bottles will afford the best protection. Manufacturers object to the use of green containers because they mask the clarity and the color of the product, but this might be overcome by wrapping the bottle in green cellophane until it is necessary to demonstrate it to the customer.

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PHYSIOLOGY

Muscle Fiber Discovery May Produce New Theory

THE WHOLE theory of muscular development may be revised as a result of the discovery of Dr. D. D. Dasen, department of oceanography, Liverpool University.

It has been assumed heretofore that muscle fibers once formed from the embryonic cells will grow to various sizes but will not give rise to new fibers. But Dr. Dasen has found that some muscle fibers do increase in numbers, and he believes this may affect the whole theory of muscular development.

Dr. Dasen has made his observations on the eye muscle of the plaice, a fish of the flounder tribe. He has found that while the number of fibers composing this muscle remains nearly constant until the fish reaches a length of about three inches, it increases suddenly in specimens about four inches long. This he concludes, is evidence that muscle grows not only by a thickening of the component fibers, as happens in the early stage of the plaice, but also by a multiplication of the fibers, as happens later in the same animals.

Science News Letter, September 2, 1933

ENGINEERING

Army Being Motorized But Infantry Still to Walk

AUTOMOBILES are providing the solution to many of the military problems of today. The adaptation of motor vehicles to the ordnance requirements of the cavalry and infantry was described by Maj. H. A. Nisley of the Ordnance Department to the Society of Automotive Engineers.

Maj. Nisley explained that the idea of having every soldier ride into battle in an armored car had been abandoned. Most of the infantry will still have to tramp through mud. It was being realized that the cavalry, the reconnaissance branch of the army, must be the first to be equipped with the speed and protection of light armored motor vehicles.

Heavy and slower tanks which grew out of the 1917 introduction of armored tractors are to be assigned to infantry.

For reconnaissance and light combat purposes two types of light armored cars are being developed. The former is designed as a strictly private vehicle and the armored hull serves as the chassis. The second type, called combat cars, are used by the cavalry for assault purposes in much the same way that tanks are used by the infantry.

Maj. Nisley expressed the hope that tractor manufacturers would be able to speed up the present tractors and adapt them to military requirements. Army requirements are changing so rapidly that it would be impossible to keep up a complete modern fleet of combat vehicles without entailing an enormous expense.

Science News Letter, September 2, 1933

MICROCLIMATOLOGY

Trees Help Make Climate For Insects

WHETHER or not insect pests will infest a certain species of tree is determined not only by their liking for its foliage or fruit but also by the kind of climatic welcome it offers them. For trees make little climates within their leafy shells, different in humidity and possibly in temperature and other factors from the general atmosphere and from "micro-climates" of other trees.

Dr. H. H. Darby of the Bartol Research Foundation, Swarthmore, Pa., has observed a difference in the preferences of the Mexican fruit fly in Mexico during the hot season. The insects by preference take shelter under the thick foliage of mango trees, and avoid the more open, airier crowns of the sweet limes. The chief insect parasite of the fruit fly also showed a differential behavior along the same lines.

Science News Letter, September 2, 1933

SEISMOLOGY

China-Tibet Border Feels Severe Earthquake

CONSIDERABLE damage and loss of life was probably inflicted upon the region of the city of Chengtu in the Chinese province of Zechwan near the eastern boundary of Tibet by an earthquake early Friday morning (Aug. 25) which was recorded on the seismographs of the world.

Although it will probably be days or even weeks before news direct from the shaken zone reaches telegraph lines, the center of the earthquake and its severity was determined by the U. S. Coast and Geodetic Survey using data wired Science Service by leading earthquake observatories. The approximate epicenter was 31½ degrees North latitude and 102 degrees East longitude.

Science News Letter, September 2, 1933

IN SCIEN

PLANT PHYSIOLOGY

Hydrocyanic Acid Generated By Mushrooms

HYDROCYANIC acid, deadliest of all simple chemical compounds, is formed in the caps of two species of mushrooms, it has been discovered by M. Mirande, a French scientist. The poison was found in the gills of a small mushroom belonging to the genus *Marasmius;* it is extractable in cold water from both fresh and dried material, though neither the spores nor the underground root-like threads of the mushroom contain it.

The second hydrocyanic-acid yielding mushroom belongs to the genus *Clitocybe*: the poisonous night-shining American species known as the "jack-o'-lantern mushroom" is also a member of this group. This mushroom, unlike the *Marasmius* species, gives up its poison only when heated.

Science News Letter, September 2, 1933

ENGINEERING

Emergency Brakes Declared Misnamed

EMERGENCY brake is the wrong name for the auxiliary hand brake of automobiles, was the statement made by B. B. Bachman of the Autocar Company in a report on brake design to the Society of Automotive Engineers.

The secondary brake was called the emergency brake because it was used frequently when the foot brakes failed in the early days of automobiles. Mr. Bachman pointed out that modern four wheel brakes were entirely sufficient to stop modern motor vehicles and that the emergency brake had been relegated to parking operations alone.

One reason why manufacturers have continued to equip cars with a secondary brake is the law in many states that requires two separate and independent sets of brakes. Automotive engineers are puzzling out means of obtaining more space for brakes on the wheels and feel that the elimination of the secondary brake would be an advantage.

Science News Letter, September 2, 1933

NE FIELDS

CHEMISTRY

Gas Is Called Most Humane War Weapon

GAS WARFARE is the most humane of the methods of warfare, stated Dr. Philip B. Matz of the U. S. Veterans' Administration, Washington, in a report to the American Medical Association. Dr. Matz explained his opinion of gas as a humane warfare method by pointing out that of 70,752 casualties as a result of gas in the American forces during the World War, only 200 died immediately.

He presented the results of a careful investigation of the clinical records of nearly 500 men gassed by various gases. Most serious after effects appeared in cases of gassing with phosgene. In this group of men a number of cases of nervous and mental ailments as well as lung diseases developed.

The gas was not directly responsible for the mental ailments, Dr. Matz explained. But its severe effect on the individual man, particularly the swelling of the lungs which interfered with breathing, provided the exciting factor in persons with a constitutional defect of brain and nervous system.

Science News Letter, September 2, 1933

BACTERIOLOGY

Bacteria React Queerly To Ultraviolet Radiation

ULTRAVIOLET raying is usually declared to be deadly to bacteria when cultures of the latter do not show an increase in their numbers. But sometimes the bacteria are not killed, only driven into freak growth types, Dr. Frederick L. Gates of Harvard University has stated in a report to *Science*.

Dr. Gates rayed cultures of the common colon bacillus with ultraviolet light of a wavelength known to be unfavorable to their growth. Some of the cells died immediately, others were apparently unaffected and continued to grow and divide normally. Between these two classes, however, was a zone of intermediate and very strange bacterial behavior. The cells continued to increase in length without dividing, until they were scores of times their normal length. Their thickness varied from normal to three times normal diameter. These filaments, in Dr. Gates' phrase, "looked like spaghetti."

These strange growths were actively motile, weaving about like worms or snakes, or boring through the fluid like living drills.

After from two to four hours, degenerative changes set in. The long filaments either went to pieces directly, or divided crosswise into many small cell-like units which then deteriorated. Sometimes the survival of the colony was brought about by small, bright cells that pinched off at the ends of the filaments, and proceeded to produce colonies of bacteria, while the rest of the growth went on to its destruction.

Science News Letter, September 2, 1933

PHYSIOLOGY

New Device Carries Sound To Deaf Through Bones

A SMALL-SIZED portable device that enables deaf persons to hear through bones of the head has been developed by Dr. Hugo Lieber of New York City.

The method of hearing employed, which is known as bone conduction, dispenses with the outer and middle ear as channels of sound, and instead carries vibrations of sound to the inner ear by way of teeth or head bones. The deaf composer Beethoven used the well-known principle when he placed a flat stick between his teeth and rested the tip of the stick on the piano in order to catch some sounds of his own music.

Efforts to produce a small device using this principle have met with the obstacle that small vibrators would "freeze" if sufficient power needed for hearing was transferred to them. Dr. Lieber's invention, he claims, has overcome this difficulty.

In the new oscillator, power has been increased and the converted sound vibrations are conveyed to the bones of the head by the housing of the oscillator instead of by a small disk.

"In this new vibrator," Dr. Lieber explained, "a small gap enabling the production of a large power is obtained by using a rigid diaphragm stiff enough to vibrate and yet prevent the freezing action. By its construction it enables transmission of the vibrations over the casing which encloses the oscillator."

Science News Letter, September 2, 1933

PHYSICS

New Relativity Theory Suggested For Blind

A BLIND man in a scientific laboratory might find it necessary to construct a special relativity theory to account for his aural observations.

He would have to learn to read his meters and instruments by ear, and Dr. Wm. Bender of the University of Chicago suggests, in a report to the Franklin Institute, Philadelphia, that his findings might not agree with known measurements that have been visually recorded. The measuring marks on the blind man's instruments would have to shout out their location, each mark using a different tone of voice. It is conceivable that with a little practice the blind scientist might achieve an accuracy as great as could be obtained by visual means.

Dr. Bender is in doubt whether there would be agreement between measurements of the velocity of sound taken by the two methods. Only an actual experiment can decide this question. To account for any difference, a blind man's relativity theory would have to be constructed.

Science News Letter, September 2, 1933

ENGINEERING

Rubber Tires Show Advantages For Tractors

RUBBER tires on tractors have been shown to be more economical than the ordinary steel wheels by Prof. C. W. Smith of the University of Nebraska, who reported his findings to the Society of Automotive Engineers meeting in Chicago this week. (*SNL*, Oct. 29, '32, p. 257.) Savings in fuel and time were evident from the tests conducted by Prof. Smith. Tractors equipped with rubber tires often took a load in high gear that would almost necessitate low gear with the conventional steel wheels and lugs.

One of the features pointed out was the reduction in the tearing up of the soil and the consequent decrease in dust stirred up by the rubber tires. Prof. Smith thought that the rubber tires in addition to affording traction act like a spring, first absorbing energy and then feeding it out in an even way that more nearly utilizes the engine's full power than the rigid wheels and lugs will do.

Science News Letter, September 2, 1933

LINGUISTICS

New Research Promises To Solve Maya Writing System

Hieroglyphics Stand For Sounds, Says Harvard Worker, As He Translates Text Abandoned by Most Scholars

PERSISTENT efforts of scholars to decipher the strange picture writing system of the Mayan Indians of Yucatan will at last be rewarded, it appears from a report by Benjamin Lee Whorf, just published by the Peabody Museum of Harvard University.

For years archaeologists have pored over the stone monuments and the books that hold the written records of America's highest ancient civilization. The Mayan Indians had many books in their priestly and astronomical libraries, but when the Spaniards conquered Mexico, missionary zeal made huge bonfires of the heathen picture books, and only three Mayan books survived.

Modern scholars, studying these books and the numerous stone-carved inscriptions in ruined Mayan cities, were successful to the extent that they learned to read the signs that represented dates and astronomical calculations. This was more of an achievement than the bare statement would suggest for most of the inscribed monuments dealt with these matters. The students of Mayan writing also succeeded in recognizing some of the picture signs that represented Indian gods, and other symbols. But hope of understanding the system on which the writing was based has grown dim in recent years.

On Phonetic Principles

Now, Mr. Whorf has announced that the system of writing evolved by the Mayan Indians was based on phonetic principles. That is, hieroglyphics were used to stand for sounds in the language. This is a view which early students of the Mayas advanced, but which has been almost entirely neglected for forty years.

As far back as conquest days, Mexico's most famous bishop from Spain, Diego de Landa, wrote down 27 characters of Mayan writing which he believed represented sounds similar to those in the Roman alphabet. The bishop included this list in his famous relation of things found in Yucatan. But when this old Spanish work came to light in 1864, after centuries of oblivion in a library in Madrid, scholars were vastly disappointed to find that the Mayan "alphabet" was no neat key to unlock the secrets of the Mayan writings. The bishop, it was concluded, must have been the victim of a hoax played by some native informant.

Bishop's Alphabet Defended

Defending the bishop's maligned alphabet, Mr. Whorf now declares: "Landa's list of characters has certain earmarks of being genuine and also of being the reflex of a phonetic system."

Most of the 27 characters, Mr. Whorf explains, are elements frequently met in the Mayan inscriptions, and yet the characters are not precisely the same. They look as though they were dashed off and simplified through habitual use. The 27 characters do not represent all the sounds in Mayan language, nor did the Spanish bishop claim that they were any complete alphabet, it is now realized.

Aided by the old Landa alphabet and other data, Mr. Whorf has laid down some of the principles on which the Mayan writing was built. Using these, he has been able to translate some of the old texts, and with more study a much larger number will be read, Mr. Whorf declares.

That the matter is far from simple may be seen from this sentence of explanation in his scientific report: "I may now offer as conclusion that the essential principle of Maya writing lay in the use of a complicated syllabary with numerous polyphones and homophones such as the Sumerian syllabary also possessed, and with certain approximations to alphabeticism where the inherent vowel of the syllabic sign was not employed or was reinforced or varied by the addition of another sign."

Publication of Mr. Whorf's paper is hailed as an event of importance in American archaeology. Commenting on it, Prof. Alfred M. Tozzer, of Harvard, stated: "It is with no little satisfaction that the Peabody Museum publishes his paper on a subject which most Maya students have long felt was practically closed. With great acumen and courage Whorf dares to reopen the phonetic question. His paper is full of suggestions and may open up a vista for further investigations along the trail which he has blazed."

Science News Letter, September 2, 1933

CHEMISTRY

American Chemists Struggle to Overcome Potash Monopoly

AMERICAN chemists are successfully refuting Germany's alleged wartime boast that with the world's only source of potash within her boundaries she could starve the world into submission, Dr. J. W. Turrentine of the U. S. Bureau of Chemistry and Soils states in a report to be given at the Century of Progress meeting of the American Chemical Society.

America now ranks as the third largest producer of potash, a necessary agricultural fertilizer. Germany and France are the leading producers. Dr. Turrentine points out the economic value of this product by stating:

"Even during the short wartime period of potash scarcity, some of our important crops showed evidence of potash starvation."

During the period from 1929 to 1932 imports to the United States declined by 68 per cent. and the ratio of domestic sales to the total quantity of fertilizer potash consumed has advanced from 16 per cent. to 37 per cent. This achievement has been accomplished without the aid of a tariff wall.

The condition of national self-sufficiency has not been attained as yet, for 63 per cent. of the domestic market is still supplied from foreign sources. The value of the 1932 imports was nearly $6,000,000.

Science News Letter, September 2, 1933

GLASS, REAL GLASS

CHEMISTRY

New Glass Bends Far Before Breaking

FLEXIBILITY far beyond that of ordinary glass is claimed for a new German safety glass produced by a manufacturing firm at Herzogenrath near Aachen. As a demonstration of its strength and capacity for bending, three full-grown men stand on a sheet about the size of an automobile windshield, which sags under their weight, and then comes back to normal flatness after they get off it.

The glass is a real glass, the manufacturers state; not an organic plastic or artificial resin. Neither is it a laminated or "sandwich" glass, insured against splintering by cementing a layer of plastic material between two sheets of ordinary glass. It is a solid sheet, like plate glass, except that when broken it does not shatter into sharp, daggerlike splinters. If it receives a blow sufficient to break it, it breaks into rounded "crumbs" which are far less dangerous to persons whom they may strike.

Science News Letter, September 2, 1933

In the hope of producing watermelons that will resist wilt, West Virginia experimenters have been crossing two high-flavored varieties susceptible to wilt with Russian watermelons that are not edible but resist the wilt.

PHYSICS

Use of Ultraviolet Light Spreading Rapidly in Industry

Well-Known Producer of Vitamin D Now Bleaches Clothes, Detects Forgeries, Dries Fruits and Tests Paints

THERE is no question about the value of ultraviolet light in producing the anti-rachitic vitamin D, but this application is gradually giving way in importance to other applications of the invisible light. New applications are being made with such rapidity that no one can hope to predict what product will be subjected to ultraviolet treatment next.

Like most new applications of science to industry it is being used to prey upon the credulity of the uninformed purchaser, and he has been persuaded to pay a premium for irradiated goods that are not improved and perhaps partially spoiled by the treatment. It is such practise that has given the ultraviolet treatment a black eye and has caused many people to shy away from it and not take advantage of the many real advantages that it possesses.

Ultraviolet light is now being used extensively to test the deterioration of substances exposed to sunlight. Since ultraviolet sources can be made much more intense than sunlight it is possible to test paints, varnishes, papers, dyes, rubbers, and glasses by very short exposures to this artificial sunlight. Other products that have been tested for spoiling on the exposure to light are gasolines, foods and tar products.

It is now definitely established that dairy cows properly treated with ultraviolet radiation produce milk rich in vitamin D. The radiation is absorbed through the thin skin on the under side of the cow. Agricultural experimental stations are growing crops in the winter in ultraviolet illuminated greenhouses. Seeds that would not otherwise germinate are changed so that a larger percentage will grow.

The use of artificial sunlight in the preparation of various kinds of food is gaining in popularity. Such short wavelengths as are in ultraviolet radiation will kill many kinds of bacteria particularly if they are applied in large doses. The dehydrating industry that dries fruits which keep without the addition of preservatives have found that irradiation with artificial sunlight is a surer method than exposure to sunlight. Bread that has been treated after wrapping in a transparent paper will keep for at least ten days without molding. This is especially valuable with low carbohydrate breads such as are used by diabetics, for a central bakery can supply this special product to a wider region without spoilage.

Laundries have recently adapted the practise of bleaching by use of sunshine lamps. Many chemical processes that depend upon light are now substituting ultraviolet lamps for sunlight. Legal authorities have seized upon it as one of the surest methods of detecting forgeries and counterfeits. As many engineers have said, there is every reason to believe that the next few years will witness a many-fold increase in the application of radiant energy to the needs of the industrial world.

Science News Letter, September 2, 1933

ASTRONOMY

Meteors Shower Earth At Increased Rates

THE PERSEID meteor shower kept amateur astronomers throughout the United States and Canada particularly busy this year, it is shown by reports received by Dr. Charles P. Olivier, Director of the Flower Astronomical Observatory of the University of Pennsylvania.

The number of meteors seen from 133 stations located in 31 states and 5 Canadian provinces showed that the earth was in the midst of this meteoric cloud during the night of August 11-12, with a sharp falling off the next night. Meteors were seen at the average rate of more than 40 per hour which is greater than the usual annual average. Some stations reported as high as 82 meteors observed per hour.

Conditions for observations throughout the Eastern States were not favorable due to cloudy weather, but Central

States had clear skies. The number of meteors actually counted does not represent the true number falling into the earth's atmosphere for the moonlight reduced the chances of seeing very faint ones. Astronomers can make allowances for this and arrive at an estimate of the total number of meteors in the shower.

Several local programs for the determination of the heights of the meteors by simultaneous observations from two stations were ruined by clouds but it is the hope of the American Meteor Society that western plans had more success although reports have not yet been received.

The Society believes that many thousands of people observed the Perseid shower this year and points out that popular interest in meteoric astronomy is continually growing.

Science News Letter, September 2, 1933

PALEOBOTANY

Fern Prints Left In Lava That Killed Them

MOLTEN LAVA, so hot as to destroy in a moment any living thing it flows over, has nevertheless become a record book of ferns that once grew on the slopes of the great volcano Kilauea. The story of these "volcano fossils" is told by John E. Doerr, Jr., naturalist of Hawaii National Park.

One hundred and one years ago, a lava flow broke out on Byron's Ledge, a wall-like isthmus separating the craters of Kilauea and Kilauea Iki. The shallow streams of lava running down the wooded slope into Kilauea Iki destroyed all vegetation in their pathway, leaving them covered with black, shiny tongues of the hardened material.

A recently made trail cuts through some of these century-old lava sheets, the thinner ones of which can be pried up in slabs. On the under sides of the slabs there are abundant hollow moulds of the stems and leaves of ferns, showing many fine details of their structure, even to the long narrow sori or fruiting-bodies. The vegetable tissue of course has long since disappeared, except for small charred flakes in a few impressions.

Mr. Doerr raises the question whether it might not be worth while to explore the deeper lavas left by older eruptions, for the print of a plant once impressed in the lava should be good for indefinitely long periods of time.

Science News Letter, September 2, 1933

ENGINEERING

Modern Rooms Redecorated By Flip of Light Switch

Three Scenes Are Painted on Same Wall, But, By Skillful Lighting, Only One Shows Up at a Time

VARIETY being the spice of life, modern scientific ultraviolet lighting and special paints have combined to make possible the complete redecorating of a room with a flip of a switch. The usual room setting may be changed at will to that of a luminous Japanese tea garden or again to a dimly lit winter scene in a Swiss chalet.

This is all possible right in the home by the use of special phosphorescent and fluorescent paints illuminated by ultraviolet light. Ordinary non-luminous paints are used for the formal common finish that forms the standard type of decoration. Over these paints it is possible for skilled artists to paint a scene of entirely different design with fluorescent paints of almost any color that will not show in daylight or with ordinary lighting fixtures. Still a third scene may be applied with phosphorescent paints that will glow in the dark.

When the visible light is extinguished and pure ultraviolet light is shone from concealed fixtures the fluorescent and phosphorescent pigments in the special paints begin to shine and the walls are lighted by a soft gentle light. When all the light, both ordinary and ultraviolet, is extinguished the phosphorescent pattern becomes visible. This new home luxury of changing scenes and relaxing atmosphere will soon be in demand.

As usual it is the advertisers who have gone ahead with these schemes. A visitor to the Century of Progress can see many commercial exhibits featuring this new use of the ultraviolet. Wall paper changes its design from a simple geometric pattern in the day to an aquarium design under artificial illumination. A single poster may have three different scenes painted on it. The surroundings of a group of children playing in sunsuits change from a beach in the middle of summer to a modern nursery equipped with sun lamps in the winter.

The development of the "black bulb" ultraviolet lamp brings these properties of certain pigments, known for more than 300 years, into commercial use. It is similar to the ultraviolet health lamps but is shielded by a dense purple glass that cuts off all the visible light. These lamps may be wired into the ordinary 110 volt electric light circuits and are small enough to be concealed in a hidden fixture. The invisible light that they generate may be directed upon the painted designs.

The phosphorescent paint stores up energy from the invisible ultraviolet light and glows more feebly than the fluorescent paint, so that it does not interfere with the second design. When all the light, both ordinary and ultraviolet, is turned off the phosphorescent paints will continue to shine in the dark in much the same way as luminous dials of watches.

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From Page 149

their atomic hearts are different. The H may be either hydrogen isotope of mass one or hydrogen isotope of mass two and the two common types of oxygen are isotope of mass 16 and isotope of mass 18. Light water or nearly all pure ordinary water is made up of the lightest hydrogen isotope one and the lightest oxygen isotope 16. (*See Next Page*)

MAINTENANCE OF OUR MENTAL ABILITIES

RADIO

an address by

Dr. Walter R. Miles

Professor of Psychology at Yale University

To be given Friday, Sept. 8, at 1:45 p. m. Eastern Standard Time over stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

Heavy water is made up of combinations of the heavy hydrogen and the heavy oxygen with the common lighter constituents. In a given sample of heavy water the amount of increased weight due to the strange hydrogen and the amount due to the heavy oxygen has never been known previously.

Prof. Lewis took a sample of water from a still that concentrated heavy water and weighed it. He found that its density was 0.000182 in excess of light water. He saturated it with ammonia when the water was at 0 degrees Centigrade and then pumped off the ammonia when the water was at room temperature. By repeating this process he was able to remove 99 per cent. of the heavy-weight hydrogen. The remaining heavy water now had an excess density of 0.000085, so that the heaviness of the original sample was due to 0.000097 of heavy-weight hydrogen.

He then started again with another sample of the same heavy water and treated it with sulfur dioxide to remove the isotope of oxygen of mass 18. His measurements showed that of the original excess density at least 0.000073 was due to this oxygen.

Adding up the figures for hydrogen and oxygen Prof. Lewis accounted for 0.000170 of the original 0.000182. He states that an improvement of this simple experiment will provide an exact method for the analysis of water containing isotopes of both elements.

Science News Letter, September 2, 1933

BOTANY

Urn Pattern Existed Long Before Urns Were Made

See Front Cover

URNS, whether for flowers or for funeral ashes, have always had much the same pattern; so much so, that the shape immediately and automatically evokes the name. But that shape existed on the earth long before the earliest neolithic potter smoothed out the walls of the first urn with skillful, muddy fingers. Numerous species of plants, and of animals of the lower orders as well, found that it met the problems of their existence admirably. Here, for example, is a kind of puffball that has been making perfect little urns for nobody knows how many millennia, as caught by the lens of Cornelia Clarke's magnifying camera. And here as elsewhere, the shape evoked the name; for the botanist who christened the genus called it *Urnia*.

Science News Letter, September 2, 1933

PHILOSOPHY

Bishop and Scientist Writes on Scientific Theory and Religion

IT IS SELDOM that bishop and scientist are combined in one mind and body. Peculiar interest therefore attaches to the voluminous book *Scientific Theory and Religion*, written by Dr. Ernest William Barnes, the Bishop of Birmingham, (published by Macmillan). Dr. Barnes is a Sc.D. (Cambridge) and he is a Fellow of the Royal Society of London. As Bishop of Birmingham he is, of course, a leader in the Church of England.

The book is an elaboration of twenty lectures delivered at the University of Aberdeen, and they range over all details of space and time, matter and stars, life and evolution, man and mind.

Dr. Barnes' lucid and comprehensive summaries of the present state of knowledge in physics, astronomy and biology are convenient and useful but not controversial in the same sense that his religio-scientific discussions may be.

Clear Beginning and End

For instance, how did the universe originate? The law of entropy, Dr. Barnes points out, points clearly alike to a beginning and to an end of those processes of material change which make life possible.

"Must we then postulate Divine intervention?" Dr. Barnes writes. "Are we to bring in God to create the first current in Laplace's nebula or to let off the cosmic fire-work of Lemaitre's imagination? I confess to an unwillingess to bring God in this way upon the scene. The circumstances which thus seem to demand His presence are too remote and obscure to afford me any true satisfaction. Men have thought to find God at the special creator of their own species, or active when mind or life first appeared on the earth. They have made him God of the gaps in human knowledge. To me the God of the trigger is as little satisfying as the God of the gaps. It is because throughout the physical Universe I find thought and plan and power that behind it I see God as creator."

Gloomy on Future

As to man's future on earth, Dr. Barnes takes the gloomy viewpoint. When we reflect upon the evolutionary history of animals upon the earth we cannot, because we are human, easily refuse to regard man as the crown and final end of the process, Dr. Barnes writes. Yet he regards man, like the cereals and the orchids, as an episode in evolution. The supreme species today will have become extinct fifty million years hence, just as the horses that multiplied and developed forty million years ago in North America have become extinct on this continent. But Dr. Barnes believes that absolute values are never destroyed and that therefore those which humanity carries must be preserved elsewhere than on this globe.

In discussing the modernist-traditionalist controversy on the virgin birth of Jesus Christ, Dr. Barnes says, "I

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have, personally, little doubt that biological research will in due course prove a human virgin birth to be possible. Probably the individual so produced would be haploid, with but half the normal number of chromosomes, and the chances are that its sex would be male. But whether haploid or normal, male or female, it would vary little from the normal mental and emotional make-up of the human race."

If the story of the virgin birth of Jesus of Nazareth be rejected, Dr. Barnes suggests that the moral ascendency and religious genius which are undoubtedly His might be held to result from a dominant mutation.

If all mutations, which are spontaneous changes within the germ cell, are to be regarded as manifestations of the creative activity of God, Dr. Barnes argues, the spiritual excellence of Jesus would then be from God.

Appeal of Immortality

Immortality appeals to Dr. Barnes. He writes.

"I have realized how vast is our ignorance of the world in which we find ourselves and to which we belong. Can it be, I am compelled to ask, that with such a feeling of ignorance I shall pass to a realm where knowledge is not, because consciousness has ceased? Must we allow that the desire to understand God's works and ways, which is one of the strongest and purest of human passions, is a vain and hopeless by-product of man's search for material comfort? Do we but rise for a moment above the waters of unconsciousness and, after a brief glance around, sink again to eternal oblivion? If such is indeed our fate, then surely the mystery of human life is unfathomable; unreason must sit enthroned above meaningless change."

Science News Letter, September 2, 1933

Among the most primitive animals living today, science names that egg-laying mammal, the duckbill, and pouched mammals such as the kangaroo and opossum.

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ENGINEERING

More Luxury and Comfort Visioned in Future Automobile

Engineer and Psychologist Discuss Coming Developments Before Meeting of Society of Automotive Engineers

THE AUTOMOBILE of the future that the consumer will demand and get was visualized by William B. Stout, president of the Stout Engineering Laboratories, before the Society of Automotive Engineers in Chicago recently.

A vehicle complete in itself, somewhere between the touring car and the most luxurious trailer and having more space available for passengers and baggage than ever before, was Mr. Stout's vision of the future automobile. He expressed the opinion that individual unit transportation by means of automobiles would be the method of travelling in the future and that the new cars must adapt themselves more and more to longer trip requirements.

Mr. Stout Looks Into Future

Many points in the design of future cars were outlined. Light weight would be a fundamental starting point. Shimmy of the front wheels and the periodic hammering on concrete roads would be eliminated by having individual springs for each wheel. From safety considerations, Mr. Stout argued that the driver's vision must be one of the first things to be improved. The long engine hood that makes it impossible to see around corners is a dangerous element of present-day car design. The corner posts, both back and front, are the cause of many accidents.

The controls of the future car must follow the present trend of easier and easier handling. Perfect brakes are demanded by the drivers. But the demand for smoothness that has led to the development of the doughnut tire has brought difficulties in the ease of handling. The future will see a solution of this difficulty, Mr. Stout prophesied.

One Universal Change

The one change that is going to be universal in all types of cars is that of decreasing weight and so improving performance and riding qualities. Mr. Stout predicted that within five years we will see motor cars without gear shifts that will be able to climb our steepest highways in high gear without any effort at all.

Health considerations will also govern the future design of automobiles was the opinion expressed by Dr. F. A. Moss of George Washington University. Air conditioning, eye strain and posture were the three points stressed by Dr. Moss. Improvements along these lines will lead to radical changes in the automobile of the future and will repay the company that initiates these advances.

Dr. Moss proposed that rats should be used to test out the air conditions in new ventilating schemes for cars. By hanging cages of rats at various points within test cars it would be possible to measure the amount of carbon monoxide and the injurious drafts present in new designs. Control of the temperature and humidity within a closed car would do much to improve the health of the occupants.

Eye Fatigue Dangerous

Statistics show that accidents are more likely to occur after a long trip and Dr. Moss stated that this can be attributed to eye strain. Tests with various types and makes of cars showed that there was a decided decrease in visual acuity with prolonged driving, particularly after the first 400 miles. Tests of this type will lead the automobile manufacturer to develop cars that create the least possible eye fatigue.

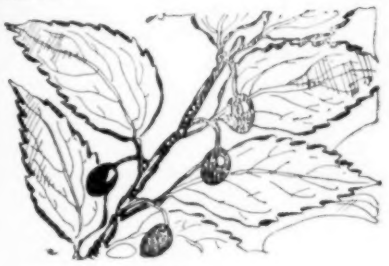
Bodily posture governed by seat design is an important factor in the health and safety of the driver. Dr. Moss stated that no researches had been published on these points and was of the opinion that they would be well worth investigating. He also suggested that some attention should be paid to hard cushions versus soft ones and of cloth versus leather upholstery.

Science News Letter, September 2, 1933

Apricots, which are richer in vitamin A than any other fruit, lose more than half this food factor when dried.

NATURE RAMBLINGS
by Frank Thone

DENDROLOGY



Hackberry

ONE OF THE most widely distributed American forest trees, even though not an especially abundant one, is the hackberry. Its several New World species range from southern Quebec westward as far as Washington and Oregon and southward into Texas and Florida. On the Atlantic seaboard it is not very plentiful, but scattering specimens keep one reminded of its presence. Everywhere it prefers the deep rich soil of moist river terraces, though it will grow well in cultivation almost everywhere.

It is a really handsome tree, with straight, clean-cut trunk usually a foot or so in diameter, though occasionally reaching as much as three or four. The bark is unmistakable—rough, ridged, pebbly. No other tree has a bark quite like it. The twigs are fine and slender, often afflicted with the fungus disease known as witches' brooms. The leaves are more or less like those of the elm, to which the tree is rather closely related.

The hackberry is used occasionally as a street tree, although its trick of striving for height without a branching trunk does not make it a favorite for that purpose. No planting scheme should ignore it entirely, however, because it is one of the most characteristic of American trees.

Because of its scarcity in most parts of the country, it has but little use as lumber. The wood is heavy and soft, without much strength, but yields itself readily enough to working. It finds some utilization in the making of cheap furniture, boxes, loose barrels, and similar more or less lowly occupations. But it is better left alive than killed for such nondescript ends.

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BOTANY-ENTOMOLOGY

Australians Rout Cactus and Seek to Maintain Supremacy

PRICKLY pear cactus, until recently the despair of Australian agricultural administrators and scientists, is at last in full retreat, conquered by an insect brought in from the native home of the cactus, the arid regions of Mexico and the southwestern United States. The insect is a moth, known to entomologists as *Cactoblastis*. Its caterpillars have within the past three years brought to utter collapse most of the cactus in the states of Queensland and New South Wales.

From America

Prickly pear was introduced into Australia from America, and repeated the old story of an immigrant weed thriving more vigorously and making itself more of a nuisance than any native. In a vegetable way it was as bad as the famous rabbit pest of an earlier generation. It simply took possession of the best of the interior grain and grazing lands, until it had sixty million acres under its sway—almost as great an area as the whole of Great Britain and Northern Ireland. The situation looked desperate. Australian scientists sought natural enemies in the cactus lands of North America, and American scientists lent their aid. The search turned up *Cactoblastis*—and *Cactoblastis* did the rest.

Nevertheless, it is too early to consider the victory complete and final, the scientists warn. At least one species of cactus in Australia is not completely killed by the attack of *Cactoblastis*. The caterpillars destroy all overground growth, it is true, but this species has underground bulbs that can renew the growth. Whether the moth will linger behind in sufficient numbers to do a good "mopping-up" on these survivors of the enemy is not yet known. And there is also the possibility that some cactus species, hitherto of little account as a pest, may possess immunity to the *Cactoblastis* attack and thereby be qualified to move into the terrain vacated by its exterminated sister species.

Enemies of The Enemy

It is also known that *Cactoblastis* is exposed to the attack of enemies, principally parasitic insects that attack it in egg, caterpillar or chrysalis stages. These have not been sufficiently numerous or active to check the beneficent insect during the great increase in its numbers which accompanied its major drive against the cacti, but they may catch up with it now that a reduction in food supply necessarily brings on a diminution in its numbers. Australian entomologists are seeking "secondary parasites"—enemies of these enemies of *Cactoblastis*.

Embattled Australian farmers may therefore be allowed three cheers, but they had better reserve the "tiger" until they are quite sure the enemy is finally and completely routed.

Science News Letter, September 2, 1933

Florida farmers are now growing all kinds of winter vegetables, since it was found that the trouble with these crops was a lack of manganese in the soil.

A thrilling journey into the future of science

THE UNIVERSE ★ *of* LIGHT ★

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England's noted physicist surveys the progress made and to be expected in the study of radiation.

"One of the important books of this year"—*N.Y. Her.-Trib.*

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•First Glances at New Books

General Science

OFFICIAL GUIDE BOOK OF THE FAIR—*Century of Progress*, 194 p., 25c. Because the theme of Chicago's educational show is science, this guide is replete in information that the person interested in science will wish to have as a matter of general information. It is of course a time saver for those who journey to the fair.

Science News Letter, September 2, 1933

Sociology

PLANNING FOR THE SMALL AMERICAN CITY—Russell Van Nest Black and Mary Hedges Black—*Public Administration Service, Chicago*, 90 p., $1. An outline of principles and procedure especially applicable to the city of 50,000 or less. The first part tells how to make the city plan, the second part explains what modern planning offers the small city, and the final part of the pamphlet deals with carrying out the city plans.

Science News Letter, September 2, 1933

Agriculture

FACTS FOR FARMERS—Compiled by Noble Clark—*Univ. of Wisconsin*, 144 p. The annual report for 1931-32 of the Director of the University of Wisconsin Agricultural Experiment Station.

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Economics

IMPACT OF THE DEPRESSION ON BUSINESS ACTIVITY AND REAL INCOME IN MINNESOTA—Edited by Roland S. Vaile—*Univ. of Minnesota Press*, 59 p., 75c. An economic study by six professors of the University of Minnesota.

Science News Letter, September 2, 1933

Sociology

SOCIAL PROBLEMS AND SOCIAL PROCESSES—Edited by Emory S. Bogardus—*Univ. of Chicago Press*, 154 p., $1.50. Selected papers by representative American sociologists delivered at the 1931 Washington meeting of the American Sociological Society.

Science News Letter, September 2, 1933

Animal Psychology

AN INTRODUCTION TO ANIMAL PSYCHOLOGY: THE BEHAVIOR OF THE RAT—Norman L. Munn—*Houghton Mifflin*, 439 p., $3. An introduction to the problems and methods of animal psychology and a review of the literature on the behavior of this most widely used of laboratory animals. A comprehensive bibliography is included in an appendix.

Science News Letter, September 2, 1933

Psychology

THE APPROACH TO THE PARENT—Esther Heath — *The Commonwealth Fund*, 163 p., $1.25. Child guidance experts found early in their experience that the greatest difficulty they have to face is not the problem child but his problem parents. This book gives helpful hints on how to deal with them tactfully but effectively. If you have children that sometimes worry you, this book will help you to look at your problems from a detached point of view. At the back of the book are reproduced leaflets used by the Los Angeles Child Guidance Clinic. One of these is entitled "Manners in Discipline." The title may start a new train of thought.

Science News Letter, September 2, 1933

Psychology

CHILDREN'S SLEEP—Samuel Renshaw, Vernon I. Miller, and Dorothy P. Marquis—*Macmillan*, 242 p., $2. This volume is the report of an experimental study of the effect of the "movies" on the sleep of children. The youngsters in this study were shown a wide variety of films and the following increases or decreases in restlessness during sleep made a matter of interesting record. The possibility of eyestrain in children from the flicker frequencies in use was explored as were also the effects of loss of sleep and the influence of coffee.

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Psychology

CHILD PSYCHOLOGY—Arthur T. Jersild—*Prentice-Hall*, 462 p., $3. Based for the most part on the author's objective experiences with children in public schools, day nurseries, and nursery schools, particularly the Child Development Institute of Teachers College. Of special interest is the chapter on "The Child's Fears," which contains the results of Dr. Jersild's recent research on this subject.

Science News Letter, September 2, 1933

Astronomy

THE A B C OF THE HEAVENS—Ral[ph] Baxter Larkin—*Star Map Association Claremont, Calif.* 8 p., $1. The secondary title of A Primer-Atlas of [the] Stars for John Doe is modestly appropriate. The amateur star gazer can find here a valuable fund of informatio[n]. The accompanying charts have many novel features, particularly in the lettering. They are drawn on a large scale with the minimum amount of bothersome detail and background. The text serves as a guide for the use of the charts.

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Astronomy

STAR CHARTS—Ralph Baxter Larkin—*Star Map Associates*, 77c. Three charts identical with those in the above book, printed on board for convenience.

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Astronomy

THE SPANGLED HEAVENS—Lawrence Edwards—*Lippincott*, 115 p., $1.25. An introduction to astronomy, writt[en] for the British public. It is a sat[isfactory] brief introduction to the solar [system], planets, comets and meteors, stars, and nebulae. The author is a "youthful student of the stars" and he writes for young people.

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Education—Research

ECONOMY IN HIGH EDUCATION—David S. Hill and Fred J. Kelly— *Carnegie Foundation for the Advancement of Teaching*, 127 p., Free. Prepared as an aid in the momentous task of university budget-making by the cooperative efforts of a staff associate of the Carnegie Foundation and a staff member of the U. S. Office of Education. Because of lack of printing fund due to the economy slashes in the Federal Government, the bulletin has been published by the Foundation. Where and how economies can be effected and what should be preserved receive consideration. In the chapter on research, the need is stressed for interstate, regional, and even national cooperation and planning.

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